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Does increasing temperature cause drought? New insights from radiation measurements

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A very widely held public perception is that increasing temperature is a cause of drought. The agricultural and hydrologic scientific communities have a very different interpretation with drought being the cause of increasing temperature. This is a classic cause-effect problem that has resisted definitive explanation due to the lack of radiative observations at suitable spatial and temporal scales. We address this using the comprehensive CERES satellite radiation data that has been recently released by NASA. This new satellite data offers the first opportunity to examine the underlying radiative basis of drought at useful spatial ($\sim$ 100's-1000's km) and temporal (monthly) scales. We find that incoming shortwave radiation increases during drought. The partitioning of that radiative perturbation is very different in climatically arid regions compared to wet regions. In this talk we explain the theoretical basis for that difference and demonstrate that the agricultural and hydrologic interpretation holds with drought being the cause of higher temperatures.